



Email

New Strategic Directions in Spectrum Management

By Thomas Kidd and Frederick Moorefield Jr. - July-September 2014

The U.S. military's increased dependency on information superiority, proliferation of adversary anti-access technologies, and rising spectrum demand for commercial and military uses are driving change in Department of Defense (DoD) spectrum use. The [Department of Defense Electromagnetic Spectrum \(EMS\) Strategy - 2013, "A Call to Action"](#) represents the DoD Chief Information Officer's (CIO's) response to this new spectrum reality.

The DoD EMS Strategy provides a blueprint for improving how the department adapts to rapidly evolving spectrum environments and for assessing and responding to regulatory and policy changes at home and abroad. The strategy's principles lay the foundation for DoD collaboration with the Administration, other agencies, regulators and industry with regard to national-level planning needed to reduce uncertainty in our future spectrum access. As the starting point for the DoD EMS Strategy, the vision is "Spectrum access when and where needed to achieve mission success." For naval operations, the implications are particularly meaningful, since freedom of the seas, freedom of navigation and security at sea represent strategic interests for which spectrum is a key enabler.

Secretary of the Navy Ray Mabus recently noted that naval forces offer the unique capability to provide presence, "which really just means being in the right place, not just at the right time, but all the time. Presence helps deter potential conflicts, and it avoids escalating the situation when tensions rise."

All military spectrum managers know access to radio frequency resources, and control of the electromagnetic environment provides the backdrop that makes this presence possible. The DoD EMS Strategy is the roadmap to ensure that sufficient access to spectrum enables mission success, when and where needed by the warfighter.

DoD Spectrum Strategy

The DoD EMS Strategy, released by the DoD CIO in February, sets three goals: (1) Increase efficiency, flexibility and adaptability; (2) Improve operational agility; and (3) Sharpen responsiveness to spectrum regulatory and policy changes. Some policy improvements require a longer-term evolution. However, as DoD encounters more congested and contested spectrum operating environments, dynamic change has to start now. As a result, the DoD CIO has begun a multi-year effort that will align existing processes and require decisions about the future of key systems and capabilities. The first step is the impending roadmap and action plan for the strategy, with near- and long-term milestones. Some advances can be made quickly, and DoD will continue to improve spectrum efficiency and effectiveness as new systems are fielded over the next five to 20 years.

An increased focus on sharing is already providing a strong foundation as the department implements the EMS Strategy. More and more, DoD must turn to sharing to meet its own growing spectrum requirements. The strategy supports the President's goal to make an additional 500 MHz available for wireless broadband by 2020.

The strategy will enable the department to better navigate the balance between advancing economic security goals by sustaining U.S. wireless innovation leadership, broadband opportunities and national security objectives by ensuring that spectrum is available to meet the military's own growing bandwidth requirements. For the Navy, the challenges surrounding this balance between security and commerce are already well-known, since more than 90 percent of all world trade moves by sea and more than half of global oil shipments cross the ocean.

Against this backdrop of both a globalized economy and evolving security threats, technology innovation is a key factor in carrying out the EMS Strategy, since it will allow the U.S. military to realize a more sustainable future for spectrum-based operations. DoD will acquire efficient, flexible, and adaptable systems with more agile and opportunistic spectrum operations so that commanders in the field can complete their missions.

As a result, military systems will be better prepared to meet the demands of modern warfighting and ensure the technological superiority of our forces. This will require fully leveraging opportunities to use less congested spectrum, adopt commercial services and technologies where suitable and



MEDITERRANEAN SEA (April 9, 2014) Gunner's Mate 1st Class Alvin Johnson monitors a radar console for surface contacts in the combat information center aboard the forward-deployed Arleigh Burke-class guided-missile destroyer USS Donald Cook (DDG 75). Donald Cook, the first of four Arleigh Burke-class destroyers to be forward-deployed to Rota, Spain, is serving on a scheduled patrol in the U.S. 6th Fleet area of responsibility as part of the president's European phased adaptive approach to ballistic missile defense in Europe. U.S. Navy photo by Mass Communication Specialist Seaman Edward Gutierrez III.



SOUTH CHINA SEA (July 5, 2014) Sonar Technician 2nd class Anthony Summa, left, from New Hartford, Connecticut, answers radar questions from Sonar Technician Matthew Eaton, from Tampa Bay, Florida aboard the Arleigh-Burke class guided-missile destroyer USS John S. McCain (DDG 56). John S. McCain is on patrol in 7th Fleet area of operations supporting stability and security in the Indo-Asia-Pacific region. U.S. Navy photo by Mass Communication Specialist Seaman Alonzo M. Archer.



PASCOGOLA, Miss. (Jan. 31, 2014) The amphibious assault ship Pre-Commissioning Unit (PCU) America (LHA 6) returns to Ingalls Shipyard from acceptance trials, where the ship's main propulsion, communications, steering, navigation and radar systems were tested. America will be the first ship of its class, replacing the Tarawa-class of

implement spectrum-snaring technologies where feasible.

Military technology innovations continue to contribute to technology innovation and investment in the United States involving spectrum-dependent systems. From the Defense Advanced Research Projects Agency (DARPA) to the Naval Research Lab (NRL), innovation, research and development and a commitment to sharing are all important contributors to broader technology development efforts and the dividends they pay for both U.S. job creation and warfighting capabilities.

Linkages to Navy Efforts

Growing naval spectrum requirements are part of the United States military's increasing spectrum access needs. Navy ship crews must defend against ever more sophisticated threats such as cruise and ballistic missiles. As a result, land-based adaptation of ship-borne radars are part of the North Atlantic Treaty Organization's (NATO) new ballistic missile defenses because they offer the best range, resolution, power and antenna size combination. Signal bandwidth — the frequency range occupied by the transmitted signal — is directly related to how well the radar can resolve target details. This additional information is critical to selecting the best defense against hostile targets. In the 1990s, fleet defense radars used 40 MHz of bandwidth and depended on multiple radars to protect a formation. Today, radars use 400 MHz of bandwidth to detect small, stealthy missile targets. The Navy is already developing the next-generation solid-state radar expected to use 600-800 MHz of spectrum with more power to provide greater detection of multiple incoming targets.

Against this operational backdrop, the EMS Strategy sets a course for how the DoD will address these challenges and opportunities. Many of these efforts are already under way. After the DoD EMS Strategy was released in February, a department-wide integrated project team (IPT) was formed to implement the strategy's objectives. The IPT is led by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L), the Joint Staff/J6 (supported by the J3) and DoD CIO. The IPT, which is evaluating all facets of DoD's activities in this area, in July will provide a roadmap and action plan to evolve our spectrum access and use. These are "living documents." The strategy, roadmap and action plan will be updated periodically to reflect lessons learned, changing spectrum needs and the evolving electromagnetic spectrum environment (EME).

The EMS Strategy's focus on sharing, technology, partnerships and creative problem-solving are already under way in other policy areas as well. For example, before the strategy was unveiled, DoD proactively advanced national policy objectives for wireless broadband through both sharing and relocation measures by making the frequency band 1755-1780 MHz available for an upcoming Federal Communications Commission (FCC) Advanced Wireless Service-3 (AWS-3) auction through a combination of clearing, sharing and some compression.

The DON has focused on strategic spectrum considerations for several years, including the DON CIO's 2006 "[Electromagnetic Spectrum Campaign Plan](#)," which addresses many of the challenges and objectives of the DoD EMS Strategy and the 2007 DON "[Strategic Vision for Spectrum](#)." The 2007 Strategic Vision focused on how a proactive, time-phased strategy based on naval warfare requirements would better enable forces to operate any time or any place, with superior capabilities. In 2011, the Secretary of the Navy issued instruction for [Electromagnetic Environment Policy and Management](#), [SECNAVINST 2400.2](#), and in April the DON established a Spectrum Supportability IPT to improve lifecycle continuity and integration of all spectrum supportability processes.

In August 2013, the Navy Marine Corps Spectrum Center and subject matter experts (SMEs) from the DON Spectrum Management (SM) and Electromagnetic Environmental Effects (E3) communities met and recognized the need to integrate and standardize processes to extract common data from current SM/E3 "legacy" business processes. To support this effort, they identified the need to establish a Department of the Navy Spectrum Supportability (SS) IPT and to create a centralized SharePoint site. The SIPR Sharepoint site will be used to collect and share SS/E3 data and host the creation, submission and tracking of Spectrum Supportability Risk Assessment (SSRA) documents as they move through the acquisition and SS business processes.

On April 30, the DON CIO and ASN for Research, Development and Acquisition (RD&A) co-signed a DON memorandum that established the DON Spectrum Supportability IPT to improve lifecycle continuity and integration of all spectrum supportability processes. The guidance in the memorandum applies to the Office of the Secretary of the Navy, the Chief of Naval Operations (CNO), the Commandant of the Marine Corps (CMC) and all Navy and Marine Corps commands, units, installations, organizations and activities.

Partnerships/Way Forward

Successful partnerships — across the military and outside of it — are intrinsic to carrying out the strategy's goals. Going forward, this will include drawing on lessons learned from the U.S. Navy's Strategic Vision for Spectrum, ongoing implementation activities and related efforts to improve naval electromagnetic spectrum agility.

For example, the [Information Dominance Roadmap 2013-2028](#) issued by the Deputy Chief of Naval Operations for Information Dominance, Director of Warfare Integration for Information Dominance (OPNAV N2/N6F) in March 2013, addresses the need for assured electromagnetic spectrum access, including radars. "This will require innovative techniques and adaptive RF solutions that enable sharing of the entire EM Spectrum (including federal and non-federal frequency bands), and leverage gray and white space technology to give the Navy the EM maneuver space it requires to execute war

amphibious assault ships. The ship was

christened on Oct. 20, 2012 and is undergoing construction in Pascagoula, Miss. U.S. Navy photo by Mass Communication Specialist 1st Class Lewis Hunsaker.

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...and time speed technology to give the Navy the environment spectrum requires to execute that plans under any threat condition," according to the roadmap.

Among the advanced capabilities the roadmap cited in this regard was the ability to field increased numbers of line-of-sight (LOS) communication systems for tactical operations with a common set of shipboard RF apertures and components for communications, EW and navigation radars.

The balancing of federal and non-federal sharing equities is also a center point in proposed rules under consideration now at the FCC that are examining spectrum sharing techniques for advanced wireless broadband technologies in the 3500-3700 MHz band. National regulators are assessing how to allow wireless broadband access and operation in this band through a spectrum access system, a dynamic database or databases that rely on technical and functional requirements to manage access and operations across three tiers. Policymakers are assessing how future rules could protect new commercial systems from co-channel interference from high-powered military in-band shipborne and adjacent band DoD ground-based radar systems.

Through their respective spectrum strategies and related initiatives, including innovative spectrum IPT efforts, the DoD CIO and the Department of the Navy are forward-leaning in assessing the relative operational impacts and opportunities of sharing policies changes, technology advances and new partnerships.

Going forward, these efforts will continue to be refined and improved as part of the goals of the DoD EMS Strategy. The strategy itself is designed to evolve as the spectrum regulatory environment changes, innovative technologies advance, and the threat environment that DoD's spectrum-based capabilities face dynamically shifts. The strategy's goals of increasing efficiency, flexibility and adaptability, improving operational agility and sharpening responses to regulatory changes will provide guideposts to these efforts.

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